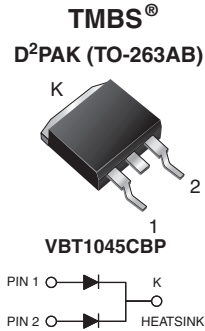


## Trench MOS Barrier Schottky Rectifier for PV Solar Cell Bypass Protection

 Ultra Low  $V_F = 0.34\text{ V}$  at  $I_F = 2.5\text{ A}$ 

**DESIGN SUPPORT TOOLS**
[click logo to get started](#)
**3D**  
Models  
Available

**FEATURES**

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- $T_J$  200 °C max. in solar bypass mode application
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

**TYPICAL APPLICATIONS**

For use in solar cell junction box as a bypass diode for protection, using DC forward current without reverse bias.

**MECHANICAL DATA**
**Case:** D<sup>2</sup>PAK (TO-263AB)

 Molding compound meets UL 94 V-0 flammability rating  
Base P/N-E3 - RoHS-compliant, commercial grade

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

E3 suffix meets JESD 201 class 1A whisker test

**Polarity:** as marked

**Mounting Torque:** 10 in-lbs maximum

| PRIMARY CHARACTERISTICS         |                               |
|---------------------------------|-------------------------------|
| $I_{F(AV)}$                     | 2 x 5.0 A                     |
| $V_{RRM}$                       | 45 V                          |
| $I_{FSM}$                       | 100 A                         |
| $V_F$ at $I_F = 5.0\text{ A}$   | 0.41 V                        |
| $T_{OP}$ max. (AC mode)         | 150 °C                        |
| $T_J$ max. (DC forward current) | 200 °C                        |
| Package                         | D <sup>2</sup> PAK (TO-263AB) |
| Circuit configurations          | Common cathode                |

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)                               |                            |             |      |
|--|----------------------------|-------------|------|
| PARAMETER  | SYMBOL                     | VBT1045CBP  | UNIT |
| Maximum repetitive peak reverse voltage  | $V_{RRM}$                  | 45          | V    |
| Maximum average forward rectified current (fig. 1)   | $I_{F(AV)}$ <sup>(1)</sup> | per device  | 10   |
|  |                            | per diode   | 5    |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode | $I_{FSM}$                  | 100         | A    |
| Operating junction and storage temperature range (AC mode)                                   | $T_{OP}, T_{STG}$          | -40 to +150 | °C   |
| Junction temperature in DC forward current without reverse bias, $t \leq 1\text{ h}$         | $T_J$ <sup>(2)</sup>       | $\leq 200$  | °C   |

**Notes**

- (1) With heatsink
- (2) Meets the requirements of IEC 61215 ed. 2 bypass diode thermal test

| ELECTRICAL CHARACTERISTICS ( $T_A = 25\text{ °C}$ unless otherwise noted) |                      |                       |                      |                      |      |               |
|---|----------------------|-----------------------|----------------------|----------------------|------|---------------|
| PARAMETER   | TEST CONDITIONS      |                       | SYMBOL               | TYP.                 | MAX. | UNIT          |
| Instantaneous forward voltage per diode                                   | $I_F = 2.5\text{ A}$ | $T_A = 25\text{ °C}$  | $V_F$ <sup>(1)</sup> | 0.44                 | -    | V             |
|   |                      |                       |                      | $I_F = 5.0\text{ A}$ | 0.49 |               |
|   | $I_F = 2.5\text{ A}$ | $T_A = 125\text{ °C}$ |                      | 0.34                 | -    |               |
|   |                      |                       |                      | $I_F = 5.0\text{ A}$ | 0.41 |               |
| Reverse current per diode   | $V_R = 45\text{ V}$  | $T_A = 25\text{ °C}$  | $I_R$ <sup>(2)</sup> | -                    | 500  | $\mu\text{A}$ |
|   |                      | $T_A = 125\text{ °C}$ |                      | 5                    | 15   | mA            |

**Notes**

- (1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle
- (2) Pulse test: Pulse width  $\leq 40\text{ ms}$



| THERMAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) |            |                 |            |                    |
|--|------------|-----------------|------------|--------------------|
| PARAMETER  |            | SYMBOL          | VBT1045CBP | UNIT               |
| Typical thermal resistance   | per diode  | $R_{\theta JC}$ | 3.5        | $^\circ\text{C/W}$ |
|  | per device |                 | 2.5        |                    |

| ORDERING INFORMATION (Example) |                  |                 |              |               |               |
|--------------------------------|------------------|-----------------|--------------|---------------|---------------|
| PACKAGE                        | PREFERRED P/N    | UNIT WEIGHT (g) | PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| TO-263AB                       | VBT1045CBP-E3/4W | 1.38            | 4W           | 50/tube       | Tube          |
| TO-263AB                       | VBT1045CBP-E3/8W | 1.38            | 8W           | 800/reel      | Tape and reel |

**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)

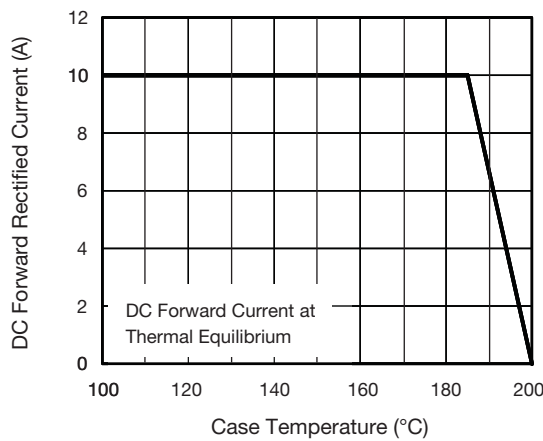


Fig. 1 - Maximum Forward Current Derating Curve

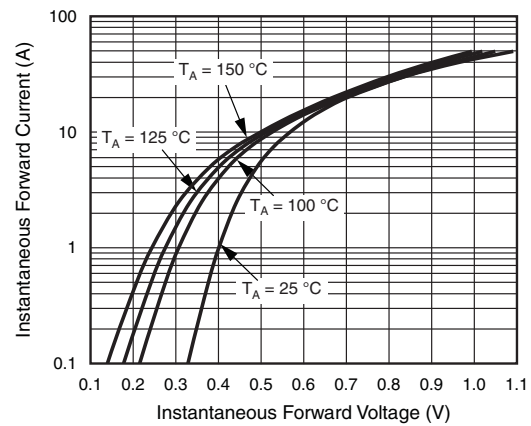


Fig. 3 - Typical Instantaneous Forward Characteristics Per Diode

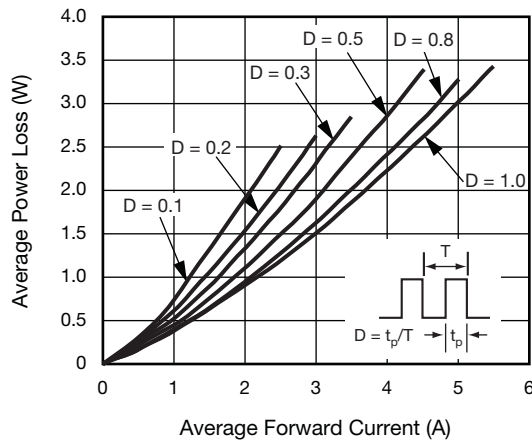


Fig. 2 - Forward Power Loss Characteristics Per Diode

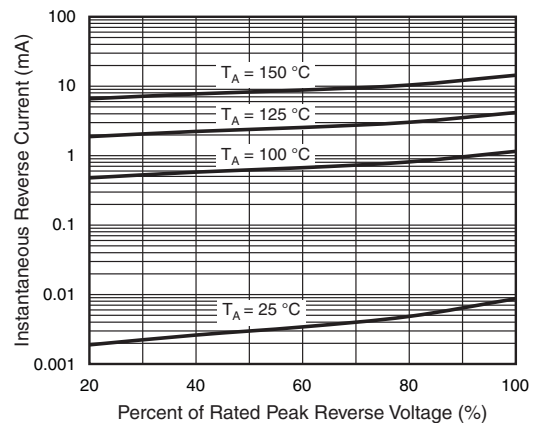


Fig. 4 - Typical Reverse Characteristics Per Diode

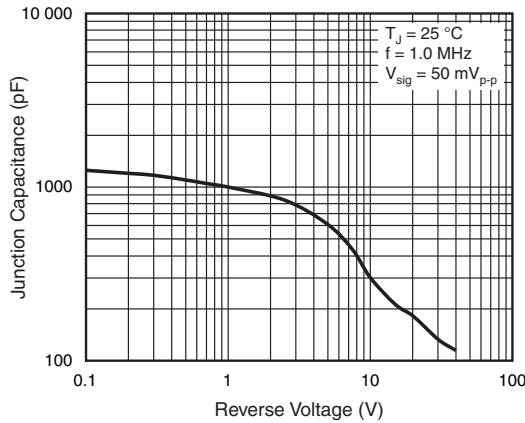


Fig. 5 - Typical Junction Capacitance Per Diode

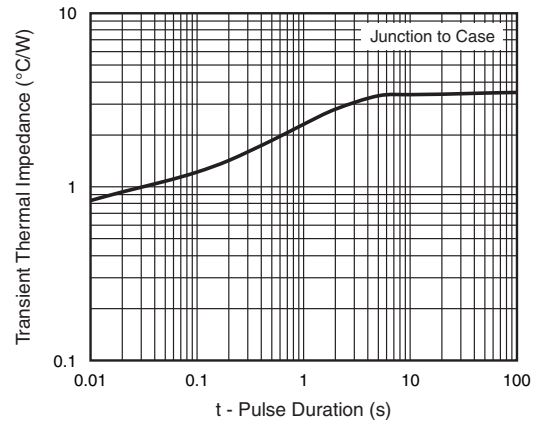
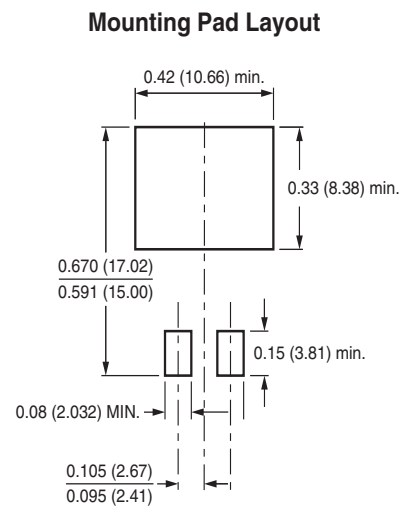
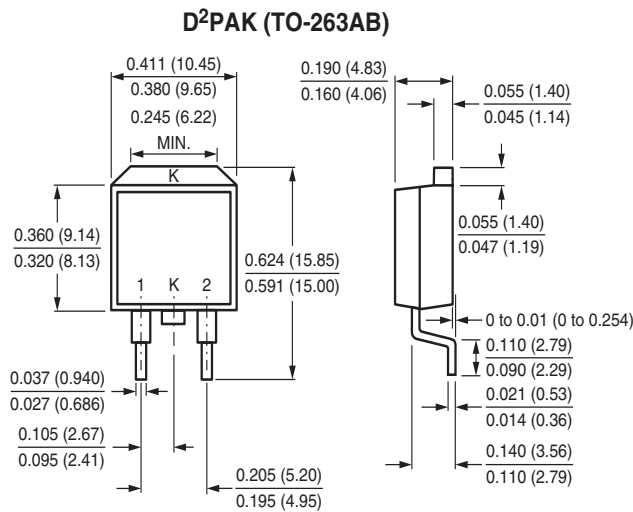


Fig. 6 - Typical Transient Thermal Impedance Per Diode

**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)





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